

## The Kepler Space Telescope

### The Planet Hunter

**Kepler** (Kep-ler) is a space **telescope** (tel-e-scope). It was named after German **scientist** (sci-en-tist) **Johannes Kepler**, who described the **motion** (mo-tion) of **planets** (plan-ets) in the early 1600s. Kepler **launched** in 2009 and began its mission: to look for planets **orbiting** (or-bit-ing) **stars** outside our **solar system** (so-lar sys-tem). So far, Kepler has found 74 planets.

### How It Works

It is very hard to see planets orbiting far-away stars. Kepler scientist Natalie Bathala says it is like trying to see a flea walk across a **distant** (dis-tant) car headlight. But Kepler has a powerful light **sensor** (sen-sor) called a **photometer** (pho-tom-e-ter). When a planet **transits** (tran-sits), or crosses in front of its star, the star's light dims a tiny bit. Kepler can see that change in the star's light.



Johannes Kepler

Kepler Space Telescope

### Another Earth?

There are many questions scientists hope Kepler can help answer. Are there other planets like **Earth**? Might those planets have living things? Kepler is looking for planets about the same size as Earth. To have living things, a planet must be close enough to its star to have **liquid** (liq-uid) water. The planet must be at just the right distance from its star to be warm but not too hot. If a planet is at the right distance from its star to possibly have living things, it is in the **habitable** (hab-it-a-ble) **zone**.

#### DID YOU KNOW??

**Kepler-22b** is the first planet found in the **habitable zone** of a star. It was found in December of 2011.

#### DID YOU KNOW??

The **habitable zone** around a star is often called the **Goldilocks zone**: It is "just right" for life.

Science says...  
**Telescopes** help us  
see **distant** objects.

distant star

planet transiting the star



## Vocabulary

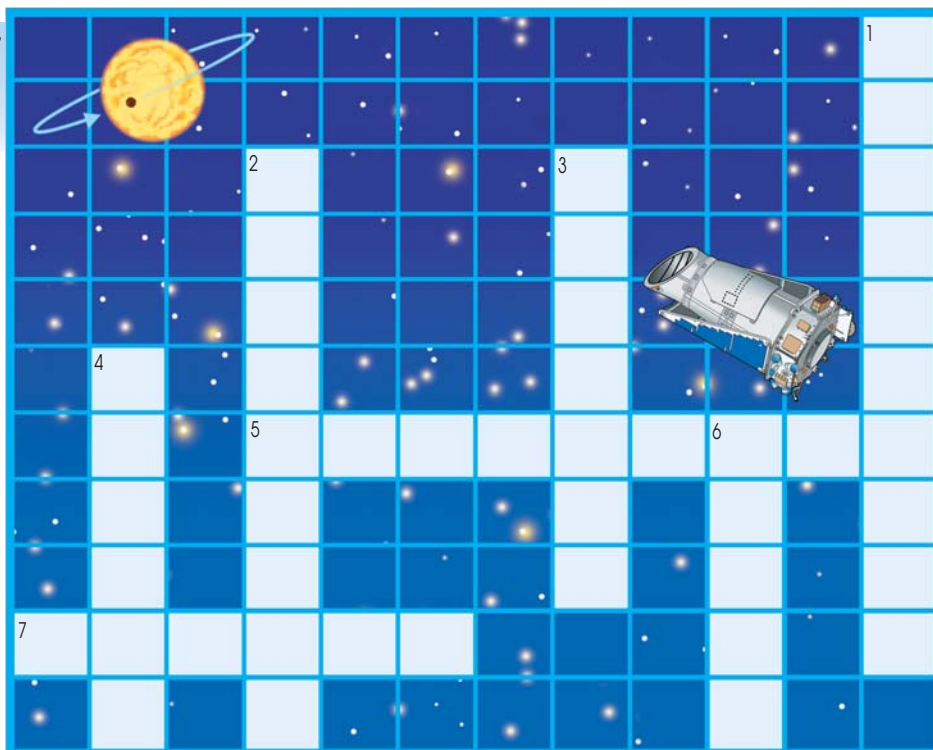
Complete the crossword puzzle.

### Down

1. Kepler's light sensor
2. zone that is just right for life
3. to cross in front of a star
4. space object around a star
6. to circle a star

### Across

5. instrument to see distant objects
7. German scientist Johannes \_\_\_\_



## Weekly Lab

How does Kepler find planets around distant stars?

### ADULT SUPERVISION REQUIRED

**ATTENTION TEACHERS:** Please read the Teaching Notes before beginning this activity.

**You need:** a lamp with a frosted incandescent bulb, modeling clay, string, safety goggles

**Step 1:** Make a small planet out of the clay.

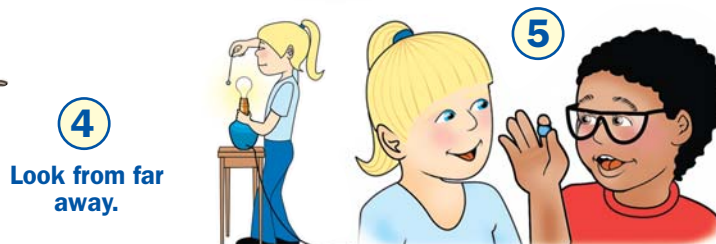
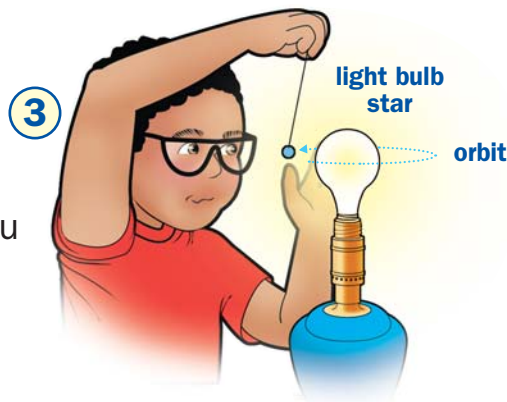
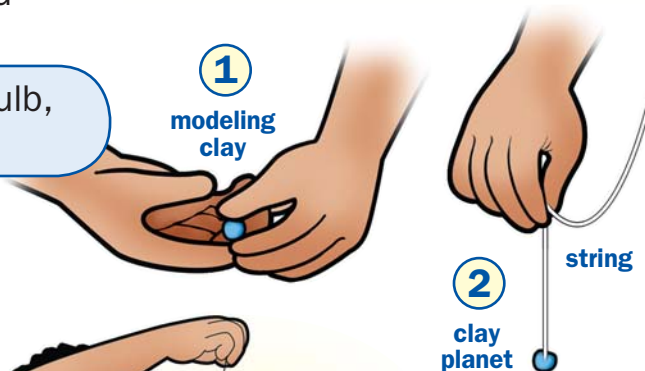
**Step 2:** Stick the planet on the end of a piece of string.

**Step 3:** Move the planet in a circle or **orbit** (or-bit) around the lit lamp bulb (star). Can you see the planet in front of the star? Write it down.

**Step 4:** Move as far away from the lab as you can. Is it harder to see the planet? Write it down.

**Step 5:** What if a star's light dims over and over in a pattern? What could it mean? Why do you think so? Talk with a partner.

A star's light dims a small bit when a planet moves in front of it. Kepler records when this happens.

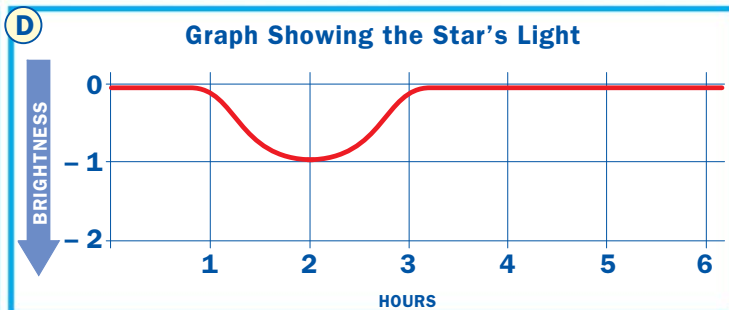
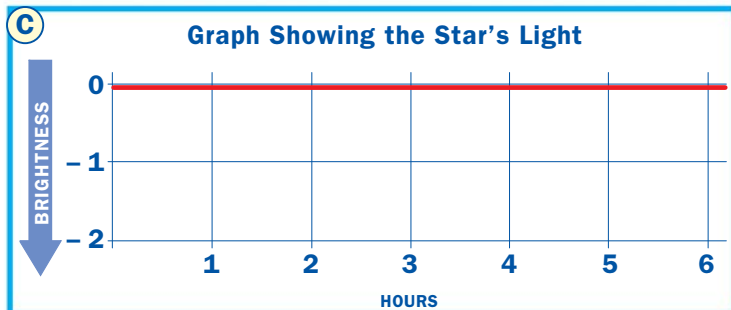
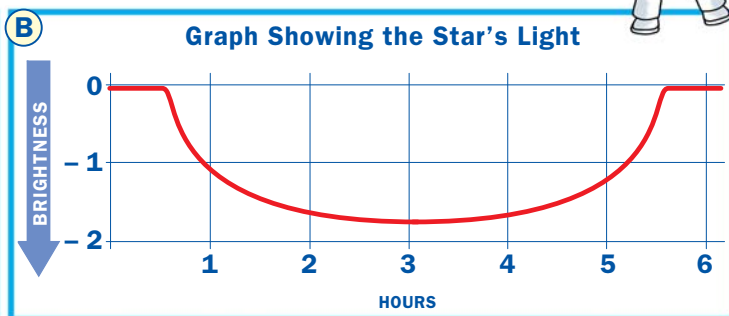
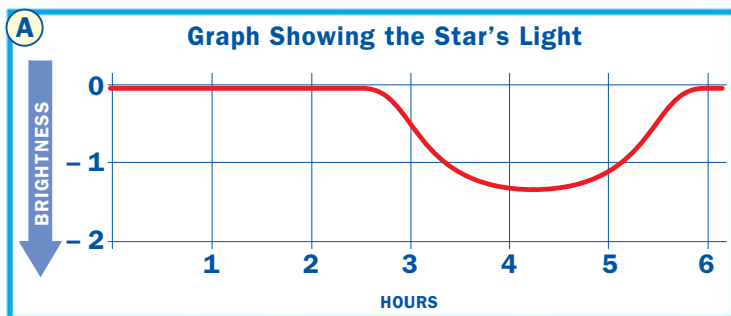






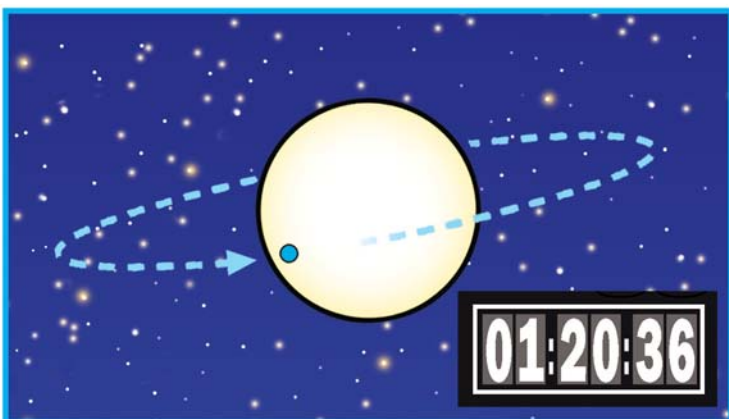
## Math

The graphs below measure the brightness of light from a distant star.



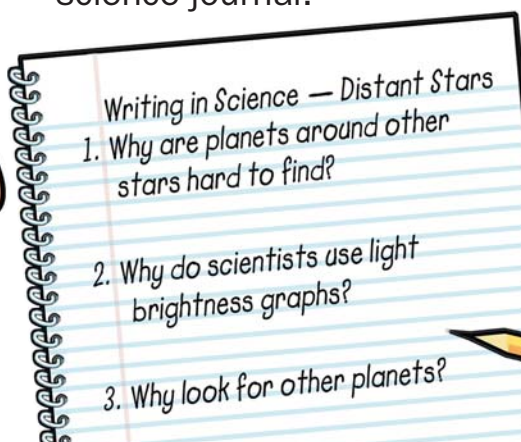
Answer the following questions in your science journal or on a separate sheet of paper.

1. What does it mean when the graph goes down?
2. What does it mean when the graph stays the same?
3. Which graphs might show a planet crossing, or transiting, the star?
4. Which graph shows a planet transiting for the longest time?



## Writing in Science

Answer the questions in your science journal.





## Challenge

Study the table and use it to answer the questions.

Planet Name	Size Compared to Earth	Days to Orbit Star
Earth	same	365
Jupiter	11 times larger	4,330
Kepler-9b	9 times larger	19
Kepler-11b	2 times larger	10
Kepler-22b	2 times larger	290
Kepler-30c	14 times larger	60



- Which two planets in the table are most similar in size to the gas giant Jupiter?
- Planets with short orbits are closest to their stars. Planets with longer orbits are farther away. Which planet is closest to its star? Which is farthest away?
- Kepler-11b is not much bigger than Earth. Look at its orbit. Do you think it is in the habitable zone?
- Which planet has an orbit similar to Earth's? Do you think this planet is in the habitable zone?



## Bringing It Home

Use the materials suggested here or other materials to make a model of the Kepler telescope. Do some research to find out about the various parts of Kepler. Write a paragraph in your science journal. Describe how you made each part of your model and how each part of the telescope is used.

**Adult Participation Recommended**

**You need:** various materials such as cardboard tubes, cardboard, paper, beads, plastic jar lids, paper clips, rubber bands; scissors, glue, markers

